



## General

### Guideline Title

Androgen therapy in women: a reappraisal: an Endocrine Society clinical practice guideline.

### Bibliographic Source(s)

Wiernan ME, Arlt W, Basson R, Davis SR, Miller KK, Murad MH, Rosner W, Santoro N. Androgen therapy in women: a reappraisal: an Endocrine Society clinical practice guideline. J Clin Endocrinol Metab. 2014 Oct;99(10):3489-510. [223 references] [PubMed](#)

### Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Wiernan ME, Basson R, Davis SR, Khosla S, Miller KK, Rosner W, Santoro N. Androgen therapy in women: an Endocrine Society Clinical Practice guideline. J Clin Endocrinol Metab. 2006 Oct;91(10):3697-710. [151 references]

This guideline meets NGC's 2013 (revised) inclusion criteria.

## Regulatory Alert

### FDA Warning/Regulatory Alert

Note from the National Guideline Clearinghouse: This guideline references a drug(s) for which important revised regulatory and/or warning information has been released.

- [October 25, 2016 – Testosterone and Other Anabolic Androgenic Steroids \(AAS\)](#) : The U.S. Food and Drug Administration (FDA) approved class-wide labeling changes for all prescription testosterone products, adding a new Warning and updating the Abuse and Dependence section to include new safety information from published literature and case reports regarding the risks associated with abuse and dependence of testosterone and other AAS.

## Recommendations

### Major Recommendations

Definitions for the quality of the evidence (+OOO, ++OO, +++O, and ++++); the strength of the recommendation (1 or 2); and the difference between a "recommendation" and a "suggestion" are provided at the end of the "Major Recommendations" field.

[Diagnosis of Androgen Deficiency](#)

The Task Force recommends against making a clinical diagnosis of androgen deficiency syndrome in healthy women because there is a lack of a well-defined syndrome, and data correlating androgen levels with specific signs or symptoms are unavailable (1|++OO).

#### Generalized Treatment of Women with Testosterone (T) or Dehydroepiandrosterone (DHEA)

The Task Force recommends against the generalized use of T by women for infertility; sexual dysfunction (except for a specific diagnosis of hypoactive sexual desire disorder [HSDD]; see the recommendation under "Testosterone Therapy for Women with HSDD" below), cognitive dysfunction, cardiovascular dysfunction, metabolic dysfunction, bone health, or well-being. There are no clear indications for these uses, and evidence of safety in long-term studies is lacking (1|++OO). In addition, government agency–approved and monitored dose-appropriate preparations are not widely available.

The Task Force recommends against the generalized use of DHEA for women because the indications are inadequate, and evidence of efficacy and long-term safety are lacking (1|++OO).

#### Treatment of Women with Low Androgen Levels

The Task Force recommends against the routine treatment of women with low androgen levels due to hypopituitarism, adrenal insufficiency, bilateral oophorectomy, or other conditions associated with low androgen levels because of the lack of adequate data supporting efficacy and/or long term safety (1|+OOO).

The Task Force recommends against routinely measuring T in women for diagnosis, because a correlation between symptoms and T levels has not been established (1|+OOO).

The Task Force recommends against the routine use of DHEA therapy in women with adrenal insufficiency because data concerning its effectiveness and safety are limited (1|+OOO).

#### T Therapy for Women with HSDD

The Task Force suggests a 3- to 6-month trial of a dose of T for postmenopausal women who request therapy for properly diagnosed HSDD and in whom therapy is not contraindicated resulting in a midnormal premenopausal value in a reference assay to avoid pharmacological T administration (2|++OO).

If T therapy is prescribed, the Task Force suggests measuring T levels at baseline and after 3 to 6 weeks of initial treatment to assess patient overuse (2|++OO).

In cases of ongoing T therapy, the Task Force suggests reviewing T levels every 6 months to monitor for excessive use and signs of androgen excess (2|++OO).

The Task Force suggests cessation of T therapy for women who have not responded to treatment by 6 months (2|++OO). No safety and efficacy data for T therapy are available after 24 months (see Table 1 in the original guideline document).

#### Androgen Therapy and Monitoring

The Task Force suggests against the treatment of women with T preparations formulated for men or those formulated by pharmacies due to a lack of data concerning efficacy and safety of these preparations in women (2|+OOO).

If a woman is to be given a trial of T therapy, the Task Force suggests checking baseline T level and the use of an approved non-oral preparation for women (such as a transdermal patch, gel, or cream) if such a treatment is available (2|+OOO).

The Task Force suggests monitoring T levels 3 to 6 weeks after initiation of therapy and every 6 months thereafter to assess for patient overuse or signs of androgen excess (2|+OOO).

The Task Force suggests cessation of therapy for women who have not responded to treatment by 6 months. Safety and efficacy data for T therapy in women are not available beyond 24 months (2|+OOO).

#### Definitions

##### Quality of the Evidence

+OOO Denotes very low quality evidence

++OO Denotes low quality evidence

+++O Denotes moderate quality evidence

++++ Denotes high quality evidence

Strength of Recommendations

1 - Indicates a strong recommendation and is associated with the phrase "The Task Force recommends."

2 - Denotes a weak recommendation and is associated with the phrase "The Task Force suggests."

## Clinical Algorithm(s)

None provided

## Scope

### Disease/Condition(s)

- Androgen deficiency
- Low androgen levels
- Hypoactive sexual desire disorder (HSDD)

### Guideline Category

Assessment of Therapeutic Effectiveness

Management

Treatment

### Clinical Specialty

Endocrinology

### Intended Users

Physicians

### Guideline Objective(s)

To update practice guidelines for the therapeutic use of androgens in women

### Target Population

Women with androgen deficiency, low androgen levels, or hypoactive sexual desire disorder (HSDD)

### Interventions and Practices Considered

Androgen therapy

## Major Outcomes Considered

- Quality of life and general wellbeing
- Sexual function
- Psychological symptoms related to menopause
- Lipid profile
- Glucose tolerance
- Body measurements
- Bone health
- Incidence of hirsutism and acne

## Methodology

### Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

### Description of Methods Used to Collect/Select the Evidence

The Endocrine Society's Task Force commissioned two systematic reviews of published data (see the "Availability of Companion Documents" field) and considered several other existing meta-analyses and trials to support the guideline.

The Benefits and Harms of Systemic Dehydroepiandrosterone (DHEA) in Postmenopausal Women With Normal Adrenal Function: A Systematic Review and Meta-analysis

#### Eligibility Criteria

Eligible studies were randomized controlled trials (RCTs) that enrolled women with surgical or natural menopause and normal adrenal function who were assigned to receive systemic DHEA or placebo and evaluated the outcomes of interest. Trials were included regardless of their size or duration of patient follow-up.

Outcomes of interest were: quality of life and general well-being, sexual function, psychological symptoms related to menopause, lipid profile, glucose tolerance, body measurements, and bone health.

#### Literature Search

An expert reference librarian designed and conducted the electronic search strategy with input from study investigators with expertise in conducting systematic reviews. The search involved multiple databases including MEDLINE In-Process & Other Non-Indexed Citations, MEDLINE, EMBASE, PsycINFO, Cochrane Central Register of Controlled Trials, Cochrane Database of Systematic Reviews, and Scopus, from their inception through January 2014. Controlled vocabulary supplemented with keywords was used to search for DHEA therapy for postmenopausal women, limited to RCTs. Reviewers also searched the bibliographies of the included studies to identify any candidate studies that might be missed by the electronic search. Content experts from The Endocrine Society were also queried for potential references.

The full search strategy is provided in the Supplemental Data for the systematic review.

#### Study Selection

All relevant abstracts were downloaded into an Endnote library and uploaded to an online reference management system (DistillerSR; Evidence Partners Inc.). Reviewers working independently and in duplicate screened the abstracts for eligibility. Disagreements from this level were automatically upgraded to the next level of screening. Full text of eligible abstracts were retrieved and screened in duplicate. Disagreements at this level were resolved by consensus. The guideline developers calculated the inter-reviewer agreement beyond chance (kappa) during the full-text screening level.

## The Benefits and Harms of Systemic Testosterone Therapy in Postmenopausal Women With Normal Adrenal Function: A Systematic Review and Meta-analysis

### Eligibility Criteria

The reviewers included RCTs that enrolled postmenopausal women with normal adrenal function who were assigned to testosterone (T) therapy with or without estrogen and compared to either estrogens alone or placebo. The outcomes included sexual function, psychological symptoms, bone health, body measurements, lipid profile, and incidence of hirsutism and acne.

### Literature Search

The search strategy was developed by a reference librarian, who received input from the study's principal investigator in compliance with the protocol and the predefined criteria. Several databases were searched, including MEDLINE In-Process & Other Non-Indexed Citations, MEDLINE, EMBASE, PsycINFO, Cochrane Central Register of Controlled Trials, EBSCO CINAHL, and Scopus. These databases were searched from July 2008 to January 2014. Eligible studies prior to July 2008 were identified from previous Endocrine Society guidelines, from a previously published systematic review addressing the same question by the Cochrane collaboration, and from a review about T without hormonal replacement therapy (HRT). The first author searched the reference sections of the included studies to identify other eligible studies that could have been missed by the electronic search. Experts from The Endocrine Society were contacted to verify the final list and identify any missing studies.

The full search strategy is provided in the Supplemental Data for the systematic review.

### Study Selection

Relevant studies were screened and selected using DistillerSR (Evidence Partners Inc.), which is a web-based software specifically designed to conduct systematic reviews. References were screened in duplicate, and conflicts were included for full-text review. Full-text screening was also conducted in duplicate, and conflicts were resolved by consensus. Reviewers calculated the chance adjusted inter-reviewer agreement using kappa statistic.

## Number of Source Documents

### The Benefits and Harms of Systemic Dehydroepiandrosterone (DHEA) in Postmenopausal Women With Normal Adrenal Function: A Systematic Review and Meta-analysis

The search identified 479 potentially relevant citations, from which 23 trials were found relevant and were eventually included in the analysis. Figure 1 in the systematic review (see the "Availability of Companion Documents" field) describes the selection process in more detail.

### The Benefits and Harms of Systemic Testosterone Therapy in Postmenopausal Women With Normal Adrenal Function: A Systematic Review and Meta-analysis

A total of 35 trials were included (see Figure 1 in the systematic review).

## Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

## Rating Scheme for the Strength of the Evidence

### Quality of the Evidence

+OOO Denotes very low quality evidence

++OO Denotes low quality evidence

+++O Denotes moderate quality evidence

++++ Denotes high quality evidence

# Methods Used to Analyze the Evidence

Meta-Analysis of Randomized Controlled Trials

Review of Published Meta-Analyses

Systematic Review with Evidence Tables

## Description of the Methods Used to Analyze the Evidence

The Endocrine Society's Task Force commissioned two systematic reviews of published data (see the "Availability of Companion Documents" field) and considered several other existing meta-analyses and trials to support the guideline.

The Benefits and Harms of Systemic Dehydroepiandrosterone (DHEA) in Postmenopausal Women With Normal Adrenal Function: A Systematic Review and Meta-analysis

Data Extraction

Data were extracted in duplicates using a standardized, piloted, web-based form. For each study, the guideline developers abstracted the following descriptive data: detailed description of baseline characteristics of the participants (i.e., age, ethnicity, and patient's description at baseline) and study characteristics (i.e., location and setting, follow-up duration, and interventions). A third reviewer compared the reviewers' entered data and resolved inconsistencies by referring to the full text of the article.

Author Contact

The guideline developers contacted the authors of the original studies when data required for analysis were missing or when more clarification was needed. Author contact was done by e-mail. If they did not receive any response, another e-mail was sent 2 weeks later.

Methodological Quality and Risk of Bias Assessment

Two reviewers independently assessed the quality of each randomized controlled trial (RCT) using the Cochrane Risk of Bias assessment tool. The guideline developers determined the following: how the randomization sequence was generated; how allocation was concealed; whether there were important imbalances at baseline; which groups were blinded (patients, caregivers, data collectors, outcome assessors, data analysts); whether there were any baseline imbalances; whether the analysis was by intention to treat; and how the patients adhered to the assigned medication. The quality of evidence was evaluated using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) methods.

Statistical Analysis

Meta-analysis was done using random effect meta-analysis described by DerSimonian and Laird to account for the heterogeneity between studies as well as within-study variability. Effect sizes were pooled using weighted difference in means (WMD) when outcomes were measured using the same scale and using the standardized mean difference (SMD) when outcomes were measured using multiple scales. Between-study inconsistency was measured by  $I^2$  statistics, which estimate the proportion of variation in results across studies that is not due to chance. The Task Force planned to assess publication bias using the Egger regression asymmetry test and visual inspection using funnel plots whenever they had an adequate number of studies and low heterogeneity. Due to multiple testing, the Task Force implemented the false discovery rate controlled procedures proposed by Benjamini and Hochberg and set the  $P$  value for significance at .015 instead of the usual .05. All analyses were conducted using STATA, version 12.1 (StataCorp LP).

Subgroup Analysis

The Task Force conducted subgroup analyses, which were determined a priori, to explain between-study heterogeneity. These subgroups were based on the length of follow-up (<12 mo vs  $\geq$ 12 mo) and study design (parallel vs crossover). For each subgroup analysis, the Task Force conducted a test for interaction ( $P < .015$  was considered to be statistically significant).

The Benefits and Harms of Systemic Testosterone Therapy in Postmenopausal Women With Normal Adrenal Function: A Systematic Review and Meta-analysis

Data Extraction

Reviewers, working independently and in pairs, used a piloted and comprehensive data form to extract the following information from each study: patient demographic data, eligibility criteria, and details about intervention and the outcomes of interest. The outcomes extracted included: 1) sexual

function, namely the number of satisfying sexual episodes, frequency of sexual activity, libido, orgasm, arousal, pleasure or enjoyment of sex, sexual responsiveness, sexual self-image, sexual or relationship satisfaction, and sexual concern; 2) psychological symptoms including personal distress, anxiety or fear, and depressed mood; 3) body measurements including body weight and body mass index (BMI); 4) bone health as measured by spine, hip, and total body bone mineral density (BMD); 5) lipid profile data, including total cholesterol, low-density lipoprotein (LDL) cholesterol, high-density lipoprotein (HDL) cholesterol, and triglycerides; and 6) androgenic side effects, including acne and hirsutism.

#### Author Contact

When the data were not available in the published articles or a further clarification was needed, the reviewers contacted the authors by e-mail. If there was no response, a repeat e-mail was sent in 2 weeks.

#### Risk of Bias Assessment

To assess the quality of the included study, the reviewers used Cochrane Collaboration's Risk of Bias assessment tool. Two reviewers independently assessed the quality of randomization methods, allocation concealment, baseline imbalances, whether blinding was done adequately and who was blinded, monitoring of adherence to the medication use, and whether analysis was done by intention-to-treat. The quality of evidence was evaluated using the GRADE methods.

#### Statistical Analysis

Meta-analysis was done using the random effect described by DerSimonian and Laird. The reviewers pooled relative risk (RR) and 95% confidence interval (CI) for dichotomous outcomes. For continuous outcomes, the Task Force calculated the WMD along with the 95% CI. When the studies used different scales to assess the outcomes, they calculated SMD. Heterogeneity was evaluated by the  $I^2$  statistics. Whenever appropriate (more than 10 to 20 studies and low between-study heterogeneity), the reviewers assessed publication bias using the Egger regression asymmetry test and visual inspection of funnel plots. To avoid the potential false positive differences due to multiple outcomes and multiple testing, they adopted the false discovery rate-controlled procedures proposed by Benjamini and Hochberg and set the  $P$  value for significance at .015 instead of the usual .05.

All analyses were conducted using STATA, version 12.1 (StataCorp LP).

## Methods Used to Formulate the Recommendations

#### Expert Consensus

## Description of Methods Used to Formulate the Recommendations

#### Participants

A Task Force appointed by The Endocrine Society, American Congress of Obstetricians and Gynecologists (ACOG), American Society for Reproductive Medicine (ASRM), European Society of Endocrinology (ESE), and International Menopause Society (IMS) consisted of six experts, a methodologist, and a medical writer.

#### Evidence

The Task Force commissioned two systematic reviews of published data and considered several other existing meta-analyses and trials. The Grading of Recommendations, Assessment, Development and Evaluation (GRADE) methodology was used; the strength of a recommendation is indicated by a number "1" (strong recommendation, the Task Force recommends) or "2" (weak recommendation, the Task Force suggests).

#### Consensus Process

Multiple e-mail communications and conference calls determined consensus. Committees of The Endocrine Society, ASRM, ACOG, ESE, and IMS reviewed and commented on the drafts of the guidelines.

## Rating Scheme for the Strength of the Recommendations

#### Strength of Recommendations

1 - Indicates a strong recommendation and is associated with the phrase "The Task Force recommends."

2 - Denotes a weak recommendation and is associated with the phrase "The Task Force suggests."

## Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

## Method of Guideline Validation

External Peer Review

Internal Peer Review

## Description of Method of Guideline Validation

Committees of The Endocrine Society, American Society for Reproductive Medicine (ASRM), American Congress of Obstetricians and Gynecologists (ACOG), European Society of Endocrinology (ESE), and International Menopause Society (IMS) reviewed and commented on the drafts of the guidelines.

## Evidence Supporting the Recommendations

### Type of Evidence Supporting the Recommendations

The type of supporting evidence is identified and graded for each recommendation (see the "Major Recommendations" field).

## Benefits/Harms of Implementing the Guideline Recommendations

### Potential Benefits

Appropriate use and monitoring of androgen therapy in women

### Potential Harms

- No safety and efficacy data for testosterone (T) therapy are available after 24 months for women with hypoactive sexual desire disorder (HSDD).
- The potential masculinizing effects of androgen therapy include acne, hirsutism, deepening of the voice, and androgenic alopecia.
- Androgen receptors have been reported in the stromal compartment of postmenopausal endometrium and in the atypical glandular compartment of endometrial cancers.
- In postmenopausal women, data concerning the role of androgens in breast cancer are conflicting. The limited observational data on the effects of T levels on breast cancer risk favor a neutral to an increased risk profile that is similar in magnitude to that observed with estrogen and progestin continuous therapy.

## Qualifying Statements

### Qualifying Statements

- Clinical Practice Guidelines are developed to be of assistance to endocrinologists and other healthcare professionals by providing guidance and recommendations for particular areas of practice. The Guidelines should not be considered inclusive of all proper approaches or methods, or exclusive of others. The Guidelines cannot guarantee any specific outcome, nor do they establish a standard of care. The Guidelines are not intended to dictate the treatment of a particular patient. Treatment decisions must be made based on the independent judgment of healthcare providers and each patient's individual circumstances.
- The Endocrine Society makes no warranty, express or implied, regarding the Guidelines and specifically excludes any warranties of merchantability and fitness for a particular use or purpose. The Society shall not be liable for direct, indirect, special, incidental, or consequential damages related to the use of the information contained herein.

## Implementation of the Guideline

### Description of Implementation Strategy

An implementation strategy was not provided.

## Institute of Medicine (IOM) National Healthcare Quality Report Categories

### IOM Care Need

Getting Better

Staying Healthy

### IOM Domain

Effectiveness

Patient-centeredness

## Identifying Information and Availability

### Bibliographic Source(s)

Wiernan ME, Arlt W, Basson R, Davis SR, Miller KK, Murad MH, Rosner W, Santoro N. Androgen therapy in women: a reappraisal: an Endocrine Society clinical practice guideline. J Clin Endocrinol Metab. 2014 Oct;99(10):3489-510. [223 references] [PubMed](#)

### Adaptation

Not applicable: The guideline was not adapted from another source.

### Date Released

2006 (revised 2014 Oct)

### Guideline Developer(s)

## Source(s) of Funding

Funding for this guideline was derived solely from The Endocrine Society, and thus the Task Force received no funding or remuneration from commercial or other entities.

## Guideline Committee

Androgen Therapy in Women Guideline Task Force

## Composition of Group That Authored the Guideline

*Task Force Members:* Margaret E. Wierman (*Chair*), Wiebke Arlt, Rosemary Basson, Susan R. Davis, Karen K. Miller, Mohammad H. Murad, William Rosner, Nanette Santoro

## Financial Disclosures/Conflicts of Interest

The Endocrine Society maintains a rigorous conflict-of-interest review process for the development of clinical practice guidelines. All Task Force members must declare any potential conflicts of interest, which are reviewed before the members are approved to serve on the Task Force and periodically during the development of the guideline. The conflict-of-interest forms are vetted by the Clinical Guidelines Subcommittee before the members are approved by the Society's Council to participate on the guideline Task Force. Participants in the guideline development must include a majority of individuals without conflict of interest in the matter under study. Participants with conflicts of interest may participate in the development of the guideline, but they must have disclosed all conflicts. The Clinical Guidelines Subcommittee and the Task Force have reviewed all disclosures for this guideline and resolved or managed all identified conflicts of interest.

Conflicts of interest are defined by remuneration in any amount from the commercial interest(s) in the form of grants; research support; consulting fees; salary; ownership interest (e.g., stocks, stock options, or ownership interest excluding diversified mutual funds); honoraria or other payments for participation in speakers' bureaus, advisory boards, or boards of directors; or other financial benefits. Completed forms are available through The Endocrine Society office.

### Financial Disclosures of the Task Force

Margaret E. Wierman, MD, Chair—Financial or Business/Organizational Interests: none declared; Significant Financial Interest or Leadership Position: Vice President Clinical Scientist, The Endocrine Society.

Wiebke Arlt, MD—Financial or Business/Organizational Interests: none declared; Significant Financial Interest or Leadership position: none declared.

Rosemary Basson, PhD—Financial or Business/Organizational Interests: none declared; Significant Financial Interest or Leadership Position: Director, University of British Columbia Sexual Medicine, UBC Department of Psychiatry.

Susan R. Davis, MBBS PhD—Financial or Business/Organizational Interests: none declared; Significant Financial Interest or Leadership Position: Board Member, the International Menopause Society.

Karen K. Miller, MD—Financial or Business/Organizational Interests: NIH support for studies of androgens in women; Lawley Pharmaceuticals is providing Androfeme crème and matching placebo for an NIH-funded study; Significant Financial Interest or Leadership Position: none declared.

Mohammed H. Murad, MD\*—Financial or Business/Organizational Interests: Knowledge and Evaluation Research Unit (Mayo Clinic); Significant Financial Interest or Leadership Position: none declared.

William Rosner, MD—Financial or Business/Organizational Interests: none declared; Significant Financial Interest or Leadership Position: none declared.

Nanette Santoro, MD—Financial or Business/Organizational Interests: none declared; Significant Financial Interest or Leadership Position: none declared.

## Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Wiernan ME, Basson R, Davis SR, Khosla S, Miller KK, Rosner W, Santoro N. Androgen therapy in women: an Endocrine Society Clinical Practice guideline. *J Clin Endocrinol Metab*. 2006 Oct;91(10):3697-710. [151 references]

This guideline meets NGC's 2013 (revised) inclusion criteria.

## Guideline Availability

Electronic copies: Available from [The Endocrine Society Web site](#) .

Print copies: Available from The Endocrine Society, 2055 L St, NW, Suite 600, Washington, DC 20036; Phone: 202-971-3636; Email: [Societyservices@endo-society.org](mailto:Societyservices@endo-society.org)

## Availability of Companion Documents

The following are available:

- Elraiyah T, Sonbol MB, Wang Z, Khairalseed T, Asi N, Undavalli C, Nabhan M, Firwana B, Altayar O, Prokop L, Montori VM, Murad MH. The benefits and harms of systemic testosterone therapy in postmenopausal women with normal adrenal function: a systematic review and meta-analysis. *J Clin Endocrinol Metab*. 2014 Oct;99(10):3543–3550. Electronic copies: Available to subscribers from the [Journal of Clinical Endocrinology & Metabolism Web site](#) .
- Elraiyah T, Sonbol MB, Wang Z, Khairalseed T, Asi N, Undavalli C, Nabhan M, Altayar O, Prokop L, Montori VM, Murad MH. The benefits and harms of systemic dehydroepiandrosterone (DHEA) in postmenopausal women with normal adrenal function: a systematic review and meta-analysis. *J Clin Endocrinol Metab*. 2014 Oct;99(10):3536–3542. Available to subscribers from the [Journal of Clinical Endocrinology & Metabolism Web site](#) .

## Patient Resources

None available

## NGC Status

This NGC summary was completed by ECRI on December 13, 2006. The information was verified by the guideline developer on January 12, 2007. This summary was updated by ECRI Institute on July 17, 2015. The updated information was verified by the guideline developer on September 2, 2015. This summary was updated by ECRI Institute on November 17, 2016 following the U.S. Food and Drug Administration advisory on Testosterone and Other Anabolic Androgenic Steroids (AAS).

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